



WM PFAS VIRTUAL FORUM: RESPONSES TO PARTICIPANT QUESTIONS

General PFAS Information

- **In terms of human health or even the environment in general, has the dose, exposure, and long-term health effects of PFAS been clearly quantified?**
 - No - Although regulators have tended to focus their efforts on analyzing the health impacts of certain long-chain PFAS compounds, more work is needed to understand the fate, exposure, and toxicity of PFAS in various environmental media.

- **What are the Waste Management community's most significant needs when it comes to managing PFAS in wastes? For example, regulations, better science, tools, etc.?**
 - Improved science on the fate, exposure, and toxicity of PFAS, as well as better clarity and consistency on PFAS waste acceptance requirements, are high priorities.

- **Do we know where PFAS 5:3 FTCA comes from?**
 - 5:3 fluorotelomer carboxylic acid is a degradation product of other PFAS compounds. One possible precursor is 6:2 fluorotelomer alcohol (6:2 FTOH), which is used as a grease-proofing agent in food packaging.

- **At what concentration do you consider a Biosolid to be "PFAS impacted"?**
 - As studies of PFAS in biosolids have preceded regulation in this area and EPA's interim guidance does not establish what concentrations of PFAS in wastes would necessitate disposal, WM typically does not consider biosolids to be PFAS impacted unless they are sources from a highly contaminated site.

Federal Regulations

- **Is the possible EPA regulation on PFAS going to dictate how it is disposed of?**
 - EPA's Interim Guidance on the Destruction and Disposal of PFAS and Materials Containing PFAS, issued on December 18, 2020, does not mandate disposition via specific destruction and disposal technologies; instead, the guidance provides information and suggested considerations for evaluating destruction and disposal options (https://www.epa.gov/sites/production/files/2020-12/documents/eo_12866_interim_guidance_on_pfas_destruction_and_disposal_-_12-18-20.pdf). Note, however, that section 330 of the 2020 National Defense Authorization Act required the U.S. Department of Defense (DOD) to ensure that incineration of aqueous film forming foam (AFFF) containing PFAS follow certain requirements. It is unclear what future EPA regulatory changes may entail, but they could further affect disposal options, as could any regulations proposed at the state level.

- **EPA was supposed to establish a groundwater cleanup threshold during the first quarter of 2020. Has there been further discussion related to the proposed cleanup threshold and a revised date for establishing the final rule? Once established, and high percentage (perhaps upwards of 90%) of the drinking water distribution systems no longer meet MCLs, what will be the next logical steps?**
 - EPA issued interim recommendations to address groundwater contaminated with PFOA and PFOS in December 2019 (https://www.epa.gov/sites/production/files/2019-12/documents/epas_interim_recomendations_for_addressing_groundwater_contaminated_with_pfoa_and_pfes_dec_2019.pdf). EPA is still in the process of determining whether to regulate PFOA and PFOS in drinking water, and the agency announced that it intends to issue a final regulatory determination (a step required before the process can commence for establishing maximum contaminant levels) in January 2021.

- **Are regulatory limits expected to be per compound or groups of compounds?**
 - This is unclear - at the federal level, EPA has begun the process of determining whether to regulate PFOA and PFOS in drinking water and is exploring several potential regulatory options, including evaluating PFAS on an individual basis, by different grouping approaches, and based on drinking water treatment techniques.

- **Is there indication from EPA on when and how any clear regulation of PFAS in waste may be implemented (e.g. through changes RCRA)?**
 - No - as noted above, EPA issued Interim Guidance on the Destruction and Disposal of PFAS and Materials Containing PFAS on December 18, 2020; however, this guidance focuses on identifying information relevant to destruction and disposal technologies and is not designed as a statement of policy. Beyond this new Interim Guidance, EPA updated its PFAS Action Plan in February 2020 (<https://www.epa.gov/pfas/pfas-action-plan-program-update-february-2020>). That plan contains different potential regulatory pathways under consideration by EPA, but no clear regulatory determinations related to PFAS in waste exist at this time at the federal level. Meanwhile, section 330 of the 2020 National Defense Authorization Act requires that DOD ensure that the incineration of AFFF containing PFAS adheres to certain requirements.

- **Does EPA have a timeline for developing regulations regarding PFAS in soil?**
 - This is unclear - EPA has not indicated whether it will pursue standards for PFAS in soil, although the agency has issued interim recommendations to address groundwater contaminated with PFOA and PFOS and is determining whether to regulate certain PFAS under the Safe Drinking Water Act, CERCLA, and the Clean Water Act.



- **What does the 70 ppt number represent?**
 - EPA has set a lifetime drinking water health advisory level of 70 ppt, individually or combined, for PFOA and PFOS in drinking water (<https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>).

Subtitle C and D Facilities

- **Are there any facilities in North America which have permits from applicable regulatory agencies to accept PFAS waste?**
 - No - to our knowledge there are no facilities with permits that specifically address PFAS waste acceptance.
- **What are the latest thoughts on landfill disposal (e.g., stabilization, solidification, chemical DEACT, etc.)?**
 - WM has been managing a limited number of low-level PFAS-contaminated soil shipments at Subtitle C and certain Subtitle D facilities because of the engineered containment these landfills provide. WM also is conducting research in several areas, including on the retention of these compounds in the waste mass under different conditions and on the application of agents to reduce leaching of PFAS compounds (stabilization).
- **What if any limits for PFAS will be required or acceptable for acceptance of material at WM landfills?**
 - WM has no immediate plans to make changes to our waste acceptance criteria, which consider site- and waste-specific criteria. The PFAS waste acceptance process is based on knowing the total PFAS concentration of incoming waste streams. Landfill design, construction, operational practices, climate, liquids and gas management, as well as permitting and regulatory considerations also are factors considered in final waste acceptance decisions.
- **From what type of sites will PFAS lab work be required i.e. airports, etc.?**
 - WM requires several categories of sites to test for PFAS prior to waste acceptance, including materials received from known PFAS manufacturing facilities, known PFAS contaminated remediation sites, fire-training/airport fire-fighting practice locations, DOD facilities under investigation (e.g., firefighting areas or crash sites), state or federal directed clean-ups involving PFAS, known PFAS spills, and other expected sources such as fire-fighting system rinses and AFFF products.



- **Does WM intend to issue Corporate-wide policy regarding PFAS waste acceptance criteria at their Subtitle D and Subtitle C landfills, or will each facility continue to issue their own (case-by-case) policy?**
 - WM has developed a corporate-wide Waste Watch Procedure for Managing PFAS-Containing Wastes that applies to all Subtitle C and Subtitle D landfills. WM landfills must comply with the Procedure and will not make individual landfill waste acceptance decisions. The waste acceptance considerations do, however, include site-specific factors.

- **Since there isn't any cleanup level for PFAS in soil, what is WM considering the PFAS soil waste? Daily cover, Subtitle D, Subtitle C?**
 - WM's corporate-wide procedure currently does not authorize PFAS-contaminated soils for use as daily cover or road building. Waste approval managers will only issue direct landfill disposal approvals.

- **What are the current landfills that will take PFAS impacted biosolids dried to 90% solids?**
 - WM will consider acceptance of dried biosolids on a case-by-case basis. The risk of rehydration in the landfill is an operational consideration. PFAS concentrations will also play a role in the waste acceptance decisioning.

- **What is landfill sequestration?**
 - The capture and storage of certain compounds within a landfill.

- **Do some modern landfill liners themselves contain PFAS?**
 - Modern landfill liners are constructed from high density polyethylene, which can be manufactured without the use of PFAS. Laboratory studies have not shown significant detections of PFAS in these materials.

Treatment Methods

- **Does Waste Management have any on-site remediation capabilities?**
 - We have an on-site treatment technology that we will be full-scale testing in Q1 of 2021. It is a low temperature non-destructive PFAS treatment technology, which can remove PFAS from soil, sludges, colloids, objects, surfaces, and vapors. The PFAS are then condensed into a salt concentrate for permanent macroencapsulation disposal at a WM Subtitle C landfill. The system provides data that can be used to map groundwater source structures; data is available real-time to approved stakeholders. Soils treated below remediation goals can be used on-site as structural fill in the remedial excavation.

- **What is the most likely accepted (publicly and regulatorily) and cost-effective disposal option for PFAS-contaminated waste material over the next 3 years?**
 - Because of the limited number of national thermal treatment facilities, WM believes that landfill disposal will likely be more cost-effective per ton of waste because of the widespread distribution of Subtitle C and D facilities and based on their proximity to PFAS-contaminated waste sources (see EPA's Interim Guidance on the Destruction and Disposal of PFAS and Materials Containing PFAS for data and information on treatment costs).

- **What is the current consensus on disposal of filtration media used for the removal of PFAS from water that isn't considered a traditional RCRA or TSCA hazardous waste?**
 - WM expects that activated carbon and resins that cannot be regenerated can be managed in the landfill environment so long as they remain unregulated.

- **What are some recommended best practices for dealing with PFAS Investigation Derived Waste (IDW)?**
 - PFAS forms films on metallic objects and those objects should be decontaminated in a sealed emissions-controlled environment. According to some studies, high pressure washing can transport PFAS contaminants through aerosol emission. WM intends to run full-scale object decontamination field testing in Q1 of 2021 using the sealed emissions-controlled treatment system highlighted at the WM PFAS Forum (M. Felker presentation).